

Net Shaping of Multifunctional Bulk Metallic Glass Containers and Structures, Phase I

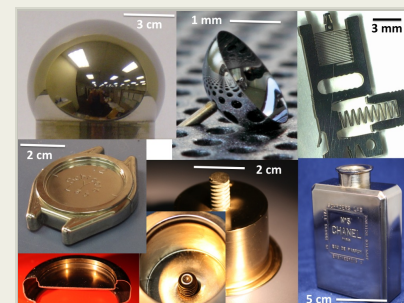
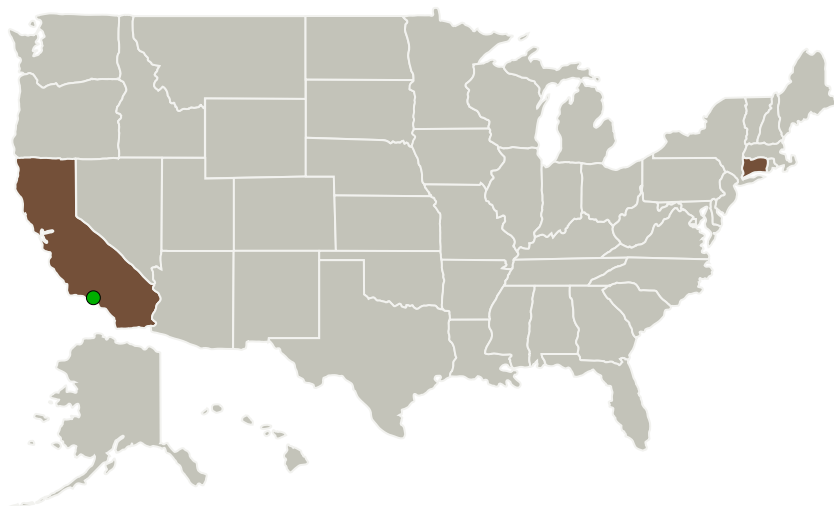
Completed Technology Project (2016 - 2016)



Project Introduction

Demand for novel manufacturing methods for space systems brings unique properties of bulk metallic glasses (BMG) into the spotlight. In addition to superior mechanical properties associated with enhanced reliability, BMG technology can offer new manufacturing processes that result in components with higher complexity, eliminate machining, reduce joining, and minimize final assembly. We propose to utilize the unique thermoplastic forming (TPF) ability of bulk metallic glasses to net-shape complex containers and structures with integrated sensors and connectors. These integrated and multifunctional BMG structures range in size from 1 cm to 10 cm and comprise of features with various length scales (1- 5000 microns). The available size range is suitable for small satellites, propellant tanks, and similar components. The fabrication method that we propose to develop for NASA applications will yield shapes and dimensional accuracies that can't be achieved with any other metal fabrication method. In addition, we will demonstrate capabilities of integrating sensors (e.g. pressure sensor) into the skin of the structure and fabricating functional surfaces. The outcome of the project will be a demonstration of capabilities to manufacture multifunctional components with superior mechanical properties for space applications with a novel, low-cost thermoplastic forming process.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Supercool Metals, LLC	Lead Organization	Industry Women-Owned Small Business (WOSB)	Branford, Connecticut
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California	Connecticut
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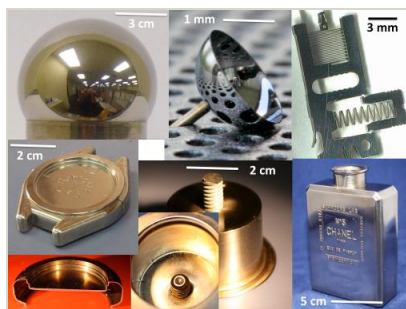
Project Transitions

**June 2016:** Project Start**December 2016:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139961>)

Images



Briefing Chart Image

Net Shaping of Multifunctional Bulk Metallic Glass Containers and Structures, Phase I
(<https://techport.nasa.gov/image/135573>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Supercool Metals, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

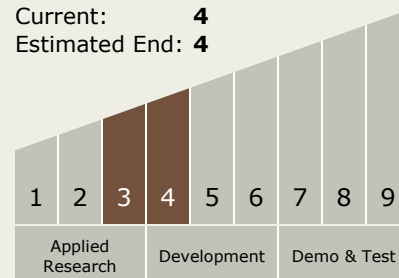
Evgenia Pekarskaya

Technology Maturity (TRL)

Start: 3

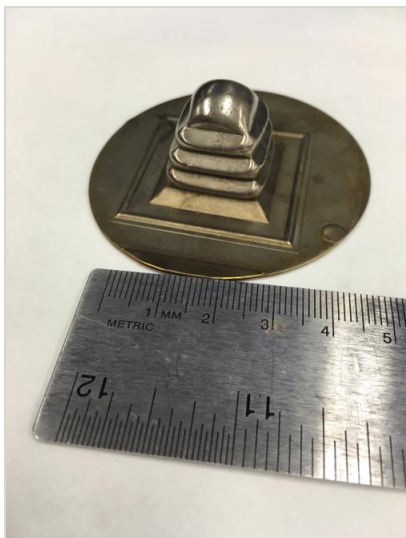
Current: 4

Estimated End: 4



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Final Summary Chart Image

Net Shaping of Multifunctional Bulk Metallic Glass Containers and Structures, Phase I Project Image (<https://techport.nasa.gov/image/137268>)

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.4 Manufacturing
 - └ TX12.4.1 Manufacturing Processes

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System